A COMPARATIVE EVALUATION OF RESULTS OF CONSERVATIVE METHODS AND INTERNAL FIXATION WITH DYNAMIC HIP SCREW IN MANAGEMENT OF INTERTROCHANTERIC FRACTURE OF FEMUR

THESIS

FOR

MASTER OF SURGERY

(ORTHOPAEDICS)

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Summary

SUMMARY

Many years ago, the fracture neck femur was a terminal event in the lives of feeble and fragile individuals who died from cardiac, pulmonary and renal complications aggravated by the recumbency and immobility. The history of development of a treatment rationale for femoral neck fracture parallels the historical development of orthopaedic surgery itself.

Ambrose Pare, the famous French surgeon, recognized the existence of hip fractures more than four hundred years ago. However, Sir Astley Cooper (1827) appears to have been the first to attempt to delineate clearly between intracapsular fractures and other fractures and dislocation about thehip. Von Langenbeck (1850) was the first to attempt operative fixation in a case of hip fracture using silver plate and screw.

Whitman (1902), with the advent of x-ray, advocated careful reduction and holding of reduced fractures in spica cast. Anderson and Childress (1932) described the well leg traction in treatment of intertrochanteric fractures of the femur. Smith-Peterson (1931), repeated Hey Groves technique of nailing under direct vision by using a triflange

nail. Thornton (1937), added side plate to the triflange nail for internal fixation of intertrochanteric fractures. This ultimately led to the development of solid nail plate by Jewett in 1941. Fixed angle nail plate devices introduced by Jewett did not allow controlled collapse and impaction at the fracture site without penetration of femoral head, stable reduction of intertrochanteric fracture was essential to prevent this complication. A screw that provided dynamic compression at the fracture site was introduced by Virgin and Mac Ausland in 1945. Schumpelick and Jantzen (1955), Pugh (1955), Massie (1962), Badgley (1960), Clawson (1964) introduced telescoping nails or screw which allowed gradual impaction at the fracture site.

Murray (1949) claimed that trochanteric fractures treated conservatively by skin traction or steinmann pin skeletal traction with Hamilton Russel traction had better results than any operation and that mortality was lower. However, Horowitz (1960) reported mortality rate of 34.6% for trochanteric fracture treated by traction and 17.5% for those treated by internal fixation. Thus, we set out in our study to compare the results of conservative method and dynamic hip screw in management of intertrochanteric fracture of the femur.

The present study was conducted in the department of Orthopaedics, M.L.B. Medical College, Hospital, Jhansi on 40 cases of intertrochanteric fracture of the femur. The patients for this study were selected from those attending the Out patient department of Orthopaedics and from those arriving at emergency department of M.L.B. Medical College, Hospital, Jhansi from Nov. 98 to Nov 99.

All the patients were subjected to detailed history, clinical examination, necessary radiological and pathological investigations. Two groups were formed, Group I treated by conservative methods and Group II treated by internal fixation with dynamic hip screw (DHS).

In Group I, 30 cases of intertrochanteric fracture of the femur were selected to be treated by conservative method, in these cases upper tibial skeletal traction or below knee skin traction was applied initially for three to four weeks. Usually fracture become "sticky" by that time and traction was removed followed by application of derotation bar or one and half hip spica for about two to two and half months to allow fracture consolidation.

In Group II, 10 cases of intertrochanteric fracture of the femur were selected to be treated by internal fixation with dynamic hip screw (DHS). Standard surgical

techniques were used for internal fixation with dynamic hip screw.

Follow up of all patients in both groups were carried out regulalry with clinical and radiological assessment at successive visits till the patients achieved maximum possible functions of the injured limb. The data thus collected from patients of these two groups was analysed, evaluated and compared with each other. Observation can be summarised as follows -

* Middle aged and elderly persons were most commonly affected by this fracture.
* Majority of patients 28 (70%) were male and 12 were (30%) females.
* Most of the patients were elderly dependent (22.5%) and farmers (26.6%).
* Commonest mode of injury was injury to fall (80%) followed by road traffic accidents (20%).
* Right side was involved in 55% of cases.
* Most of the fractures (75%) were unstable intertrochanteric fractures.
* Fourteen (35%) cases had associated past illness.

* Four (10%) cases had associated injuries to the other bone as well.

* Thirty (75%) cases were treated by conservative methods.

* In Group I, initially upper tibial skeletal traction was applied in 24 (80%) cases and below knee skin traction in 6 (20%) cases for three to four weeks followed by removal of traction and application of derotation bar in 24 (80%) cases and one and half hip spica in 6 (205) cases for two to two and half months.

* Ten (25%) cases were treated by internal fixtion with dynamic hip screw.

* Six (60%) of cases in Group II were operated with in first week of injury.

* In Group I, coxa vara developed in 24 (80%) cases, shortening <2cm in 6 (20%) cases, shortening >2cm in 24 (80%) cases and knee stiffness in 24 (80%) cases.

* In Group II there was no coxa vara and knee stiffness. Only two (20%) cases with unstable fractures developed shortening <2cm.

* In Group I, prolonged recumbency was complicated

by pressure sore in 10 (33%) cases, respiratory tract infection in 6 (20%) cases and urinary tract infection in 3 (10%) cases. While there was no such problem in any case in Group II.

* Using Kyle (1979) criteria results were evaluated and graded in both groups.

In group I, results were excellent in 4 (13.4%) cases, good in 6 (20%) cases and poor in 20 (66.6%) cases.

While in Group II, results were excellent in 8 (80%) cases and good in 2 (20%) cases. There was no case with poor results in Group II.

Taking the anatomical or near anatomical fracture union and restoration of the patient to his or her prefracture ambulatory status at the earliest possible and avoiding all problems of recumbency, the overall quality of results were better with internal fixation with dynamic hip screw (DHS) as compared to conservative methods.

CERTIFICATE

This is to certify that the work entitled "*A COMPARATIVE EVALUATION OF RESULTS OF CONSERVATIVE METHODS AND INTERNAL FIXATION WITH DYNAMIC HIP SCREW IN MANAGEMENT OF INTERTROCHANTERIC FRACTURE OF FEMUR*", which is being submitted as a thesis for M.S. (Orthopaedics) Examination, 2001, Bundelkhand University, Jhansi, has been carried by Dr. Amit Kumar under my guidance and supervision. The techniques emboided in this thesis were undertaken by the candidate himself, and observations recorded were checked by me from time to time.

Dated : 2-11-2000

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CERTIFICATE

This is to certify that the work entitled "*A COMPARATIVE EVALUATION OF RESULTS OF CONSERVATIVE METHODS AND INTERNAL FIXATION WITH DYNAMIC HIP SCREW IN MANAGEMENT OF INTERTROCHANTERIC FRACTURE OF FEMUR*", which is being submitted as a thesis for M.S.(Orthopaedics) Examination, 2001, Bundelkhand University, Jhansi, has been carried out by Dr. Amit Kumar in the Department of Orthopaedics, M.L.B. Medical College, Jhansi.

He has put in the necessary stay in the Department as per university regulations.

Dated : 3/11/2000

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Dated : 1.11.2005

(AMIT KUMAR)

CONTENTS

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Introduction

INTRODUCTION

Hip fractures are devastating injuries that most often affect the elderly and has tremendous impact on both the health care system and society in general. With life expectancy increasing each decade, our society is becoming more and more a geriatric society with significant numbers of hospitalized and nursing home patients suffering from hip fractures and their sequelae. The incidence of hip fractures which was limited significantly in elderly is now increasing among young persons who sustain high energy trauma.

Despite marked improvement in implant design, surgical techniques, and patient care, hip fractures continue to consume a substantial proportion of our health care resources. The combination of growing elderly population and a rising incidence of high energy trauma makes a thorough understanding of hip fractures essential.

Early authors placed the most of the emphasis on intracapsular femoral neck fractures and paid relatively little attention to extracapsular intertrochanteric fractures because these injuries usually healed regardless of mode of treatment. Intertrochanteric fractures constitute almost half of all fractures of the proximal femur.

Extracapsular intertrochanteric fracture occur through cancellous bone, which has an excellent blood supply. If there is no interference

with the healing process, the fracture will unite promptly. Even if it is left untreated, the fracture usually stabilizes with in eight weeks and allow weight bearing with in twelve weeks. However marked varus displacement of head and neck with an associated external rotation deformity usually results in short leg gait and a limp.

Intertrochanteric fractures are commonly seen in elderly persons and these fractures are associated with high rate of morbidity and mortality due to common geriatric problems namely cardiovascular, renal, respiratory, undernutrition and osteoporosis make the management of these fractures very difficult. Various methods of treatment have been mentioned in literature in the form of conservative and operative treatment.

Conservative treatment regimes include Buck traction, well leg traction, plaster spica immobilization, Russel balanced traction and skeletal traction through distal femur or proximal tibia.

Various operative treatment consists of internally fixing the fractures by various implants such as fixed nail plate devices, sliding nail plate devices and intramedullary devices.

Aim of present study is to compare the results of conservative methods and internal fixation with dynamic hip screw in management of Intertrochanteric fractures of the femur.

Review of Literature

REVIEW OF LITERATURE

Ambrose Pare, the famous French surgeon, recognized the existence of hip fractures more the four hundred years ago.

However, Sir Astley Cooper (1827) appears to have been the first to attempt to delineate clearly between intracapsular fractures and other fractures and dislocation about the hip.

Phillip (1867), introduced a technique for longitudinal and lateral traction to be used in femoral neck fractures to eliminate shortening or other deformity.

Maxwell (1876), reported successful use of technique introduced by Phillip.

Senn (1883), obtained higher rate of union of femoral neck fractures in dogs by using internal fixation devices.

Whitman (1902), with the advent of x-ray advocated careful reduction and holding of reduced fractures in spica cast.

Cotton (1911), recommended artificial impaction of fractures fragment by blows from a heavy mallet applied to the padded trochanter before cast application.

Ruth (1921), advocated closed reduction and maintenance of reduction in a "Phillip Splint" for eight weeks and avoidance of weight bearing for six to twelve months after traction.

Wilkie (1927), modified the Whitman method by using bilateral short-leg cast connected by a transverse bar instead of spica cast for fracture immobilization.

Anderson and Childress (1932), described well-leg traction in treatment of intertrochantric fractures of the femur.

However using normal limb for countertraction can lead to skin problems and ulceration specially in the elderly population.

Murray (1949), claimed that trochanteric fractures treated conservatively by skin traction or Steinmann pin skeletal traction with Hamilton Russel traction has better results than any operation and that mortality is lower.

Clawson (1957), used longitudinal skeletal traction in certain unstable fractures. He stressed need to adjust rotation of the limb, to use serial x-ray to evaluate fracture reduction and to encourage a daily programme of exercises.

Horowitz (1960), reported a mortality rate of 34.6% for trochanteric fracture treated by traction and 17.5% for those treated by internal fixation.

Shaftan (1967), suggested early mobilization to treat trochanteric fractures. The patient is mobilized immediately, just as if they had been treated operatively. They are not treated in traction but are given analgesics and placed in chair daily. If physical condition improves after chair mobilization they are began on

non weight bearing crutch walking. Shaftan and colleagues reported that fracture pain after a few days rarely is more severe than wound pain after open reduction and internal fixation. They also stressed that non operative treatment by their technique did not prevent fracture healing or weight bearing. The mortality of patients with conservatively and operatively treated fractures was the same in their series. However, in selecting this approach, one immediately accept a deformity of varus, external rotation and shortening because fracture itself is essentially ignored.

Aufranc and associates (1967), recommended skeletal traction in balanced suspension for ten to twelve weeks. The leg is kept in slight abduction which allows easier reduction and maintenance of normal head-neck angle. The patient then is mobilized and allowed partial weight bearing until fracture healing is solid. They noted that partial weight bearing may be required for six months before good fracture stability is obtained, and that varus displacement could occur as late as three to four months after fracture.

Friedenberg and colleagues (1972), suggest that patients with terminal illness, patient with old fracture and non ambulatory patients who are comfortable with the fracture should receive conservative treatment.

Lyon and Nevins (1977), reported that non surgical treat-

ment in nursing home is safer and far less expensive for intertrochanteric fractures in patients who have little or no chance to walk.

They recommended frequent turning, avoidance of catheterization and traction, plus nursing attention and chair transfer when pain subsides, usually in four to six weeks. These authors believe that only indication for surgical repair of a hip fracture in an institutionalized patient is a reasonable chance to regain ambulatory status.

Winter (1987), stresses that physician who chooses non surgical versus surgical treatment must be motivated by the goal to provide the best possible care for the patient and not simply to ensure economy in treatment.

He emphasizes that the decision making physician must have available a comprehensive history of the patient functional level before the fracture. Not being informed of the patient's functional situation before the fracture can lead to bad decision in treatment selection.

Hornby and associates (1989), compared operative and conservative treatment for intertrochanteric fractures of the femur in elderly patients. Operative treatment produced better anatomical results and shorter hospital stays than did conservative treatment.

Classification

According to Jensen, classification system of fractures must serve two function. First it must relate the possibility of obtaining a primary stable reduction.

Second, it must allow surgeon to predict the risk of secondary loss of this fracture reduction after internal fixation.

Boyd and Griffin (1949), presented a classification system based on the ease of obtaining and maintaining fracture reduction. They divided intertrochanteric fractures into four types.

Tronzo (1974), modified Boyd and Griffin classification by dividing their type III fracture into two separate groups thereby creating five fracture types.

Kyle and colleagues (1979), modified Boyd classification. Evans (1949), presented a simpler classification by dividing fractures into stable and unstable groups.

He further divided unstable fracture into those in which stability could be restored by anatomical or nearly anatomical reduction and those in which anatomical reduction would not create stability.

Jensen found Evans classification to be most accurate system in predicting the possibility of both anatomical reduction and secondary fracture displacement after nailing.

Evans classification : Two main types depending upon direction of fracture line.

Type I Fracture line extends upward and outward from the lesser trochanter.

Type II Fracture line is one of reversed obliquity.

Stability in type I fractures is obtained by anatomical medial cortical reduction.

Type II fractures have tendency towards medial displacement of the femoral shaft and, hence, retain a degree of instability.

Boyd and Griffin classification

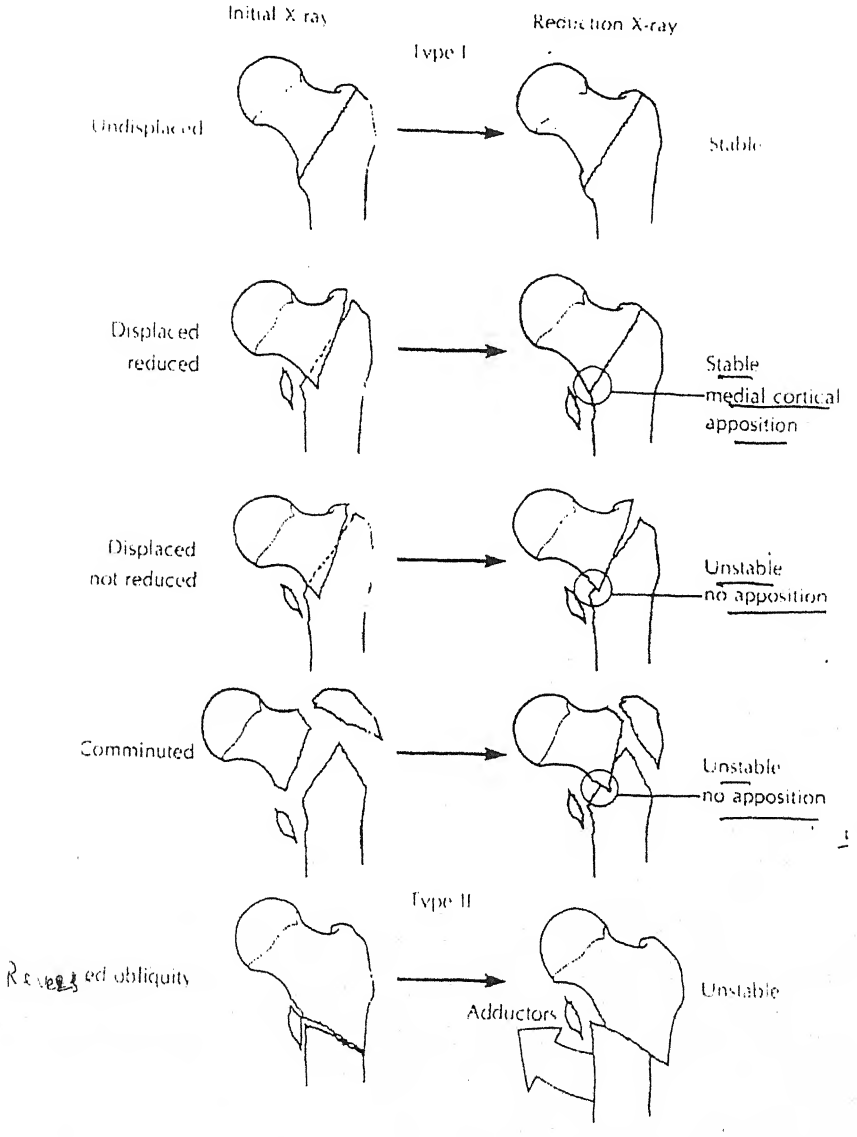
Type I Fractures are nondisplaced, stable, intertrochanteric fractures without comminution. These account for 21% of intertrochanteric fractures.

Type II Fractures are stable, minimally comminuted, but displaced fractures. These fractures represent 36% of intertrochanteric fractures and, once they are reduced, allow a stable construct.

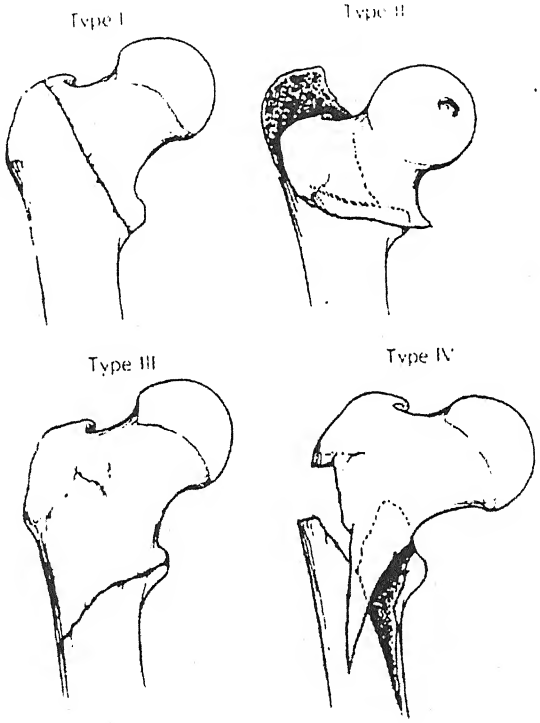
Type III Fractures have a large posteromedial comminuted area and are unstable. They constitute 28% of intertrochanteric fractures.

Type IV Fractures consist of intertrochanteric fracture with subtrochanteric component. These make up 15% of intertrochanteric fractures.

EVANS CLASSIFICATION



BOYD AND GRIFFIN CLASSIFICATION



INTERNAL FIXATION IN HIP FRACTURES

The first to have nailed a hip fracture appears to have been Von Langenbeck in 1850.

Konig (1875) and Nicolaysen (1897), advocated the use of nails in serious cases. Davis (1908), reported the use of ordinary wood screws for fixation of the femoral neck fractures.

Similar wood screws for internal fixation were used by DaCosta in 1907, Delbet in 1919 and Martin and King in 1920.

Hey Groves (1916), designed a quadriflange nail to obtain better fixation, but it was made of unsatisfactory material.

Smith-Peterson (1931), using a triflange nail, reported a series of open nailing in which he advocated reduction, impaction and internal fixation.

Johansson (1932) and Westcott (1934), simplified Smith Peterson technique by introducing cannulated nail.

Thornton (1937), added side plate to the triflange nail.

This ultimately led to the development of solid nail plate by Jewett in 1941.

FIXED NAIL PLATE DEVICES

Jewett (1941) and Holt (1963), introduced fixed- angle

nail plate devices because fixed angle plate do not allow controlled collapse and impaction at the fracture site without penetration of femoral head, stable reduction before nail insertion is essential to prevent these complications.

DYNAMIC HIP SCREW

A Screw that provided dynamic compression at the fracture site was introduced by Virgin and Mac Ausland in 1945.

Schumpelick and Jantzen (1955), Pugh (1955), Massie (1962), Badgley (1960), Clawson (1964), introduced telescoping nails or screws which allow gradual impaction at the fracture site.

Clawson (1964), pointed out that to ensure impaction, the barrel of the dynaimc hip screw device must not cross the fracture site. There also must be enough room for the implant to collapse before screw impinges on the barrel because, when such impingement occurs, the device acts as a fixed-angle plate. Failure of hip screw to slide, also results in the implant functioning as a fixed-angle plate.

The low incidence of complications found after anatomical nailing of unstable fractures by Friedenberg and collegues (1972), Sahlstrand (1974), and Mulholland and Gunn (1972) emphasizes the value of Sliding Compression hip screw in the treatment of intertrochanteric fractures.

Laros and Moore (1974), emphasized that although dynamic hip screw devices being more technically demanding but had fewer complications of fracture and non union with it than with fixed-angle devices.

Clawson and Ecker (1975), noted that the unstable intertrochanteric fractures treated with dynamic hip screw underwent shortening and medial displacement, but the fracture went onto prompt union. Although shortening of upto 1cm occured, the head did not fall into varus displacement and the fixation device did not cut through the head to damage the acetabulum.

Jacobs and coworkers (1976), demonstrated an increased incidence of joint penetration with fixed nail plate devices as compared with sliding compression screw.

Kyle and colleagues (1980), suggested that the potential of jamming or failure of hip screw to slide is decreased by maximum engagement (more than 2.5cm) of the screw in the barrel and by the use of a 150° screw plate instead of 130° implant. In devices with angles lower than 155°, greater forces perpendicular to the axis of the sliding screw are present which act to jamm or bend the device, which prevents impaction.

Jensen and colleagues (1980), demonstrated that in stable intertrochanteric fractures, choice of implant did not af-

fect results, but in unstable fractures, the sliding hip screw was the most suitable implant.

Jacobs and Colleagues (1980), demonstrated that dynamic hip screw allows an unstable intertrochanteric fractures to impact and thereby seek its own stability.Due to sliding of dynamic hip screw with settling of unstable fractures, the lever arm acting on nail plate junction shortens, therby reducing force on the implant.

Jenson (1981), suggested that controlled collapse of sliding compression hip screw improves the weight bearing capacity of implant through reduction of moment arm.

Wolfgang and coworkers(1982), noted that unstable intertrochanteric fractures treated with dynamic hip screw without obtaining bony stability has a 21% rate of mechanical failure. This rate was reduced to 10% when bony stability was obtained before the dynamic hip screw was used. They emphasized that failure of lag screw to telescope also can occur as the result of impingement of the sleeve of the side plate on the base of the proximal fragment. These authors also reported metal failure by side plate or lag screw fracture in patients in whom the fracture reduction was considered unsatisfactory. Hence, they concluded that a dynamic compression screw device must be sufficiently strong to withstand physiologic loading,

or results will be no better than those of a rigid device.

Rao and coworkers (1983), reported that fixation with dynamic hip screw in unstable fractures resulted in 90% of their fractures moving into a medially displaced position after surgery, indicating that there was no advantage to a primary medial displacement osteotomy.

Heyse-Moore and associates (1983), concluded that sliding compression hip screw is superior to the Jewett nail in the treatment of intertrochanteric fractures of the femur.

Hopkins and coworkers (1989), suggested that there was no advantage to medial displacement osteotomy over anatomical nailing when a dynamic hip screw was used in unstable intertrochanteric fractures.

Chang and coworkers (1987), also compared the stability of anatomical reduction versus medial displacement osteotomy is unstable intertrochanteric fractures. They reported that an anatomical reduction of a four part intertrochanteric fractures internally fixed with a dynamic hip screw provided significantlly higher compression across the calcar region and lower tensile strength on the plate than is obtained by medial displacement osteotomy.

Larsson and coworkers (1988), report that bending of a dynamic hip screw obstructs telescoping so that dynamic device is converted to a rigid system that does not allow impaction.

Kyle (1988), recommended using the highest-angle nail plate device that allows center head placement of the screws.

Des Jardines and coworkers (1993), found that postoperative complications and early mortality rates to be the same in unstable intertrochanteric fractures treated by anatomical nailing with dynamic hip screw and those treated by medial displacement osteotomy. In addition, operating time and blood loss were greater in the osteotomy group. These authors concluded that there is no need for medial displacement osteotomy in unstable intertrochanteric fractures treated with a dynamic hip screw.

Yoshmini and coworkers (1993), report that high nail plate angle and longer screw barrel engagement have no correlation with ease of sliding, even in unstable fractures. These authors found quality of reduction and fracture stability to be the main factors related to screw sliding.

Spivak and associates (1993), discusses four modes of failure of the sliding screw in hip fracture fixation.

1. Cutting out of the compression screw from the femoral

head.

2. Pulling off the side plate from the femoral shaft.

3. Disengagement of the sliding compression hip screw from the barrel.

4. Failure of the hip screw.

They reported that all screw failure are related to non-union of the original fractures or the development of a second fracture in the region spanned by the sliding screw. Weakness of the lag screw occurs at the points where outer (proximal) and inner (distal) threaded portions of the screw are located. When the inner threaded part of the screw is in the barrel, the screw barrel junction is the site most prone to the failure. These authors note that screws break at the deepest aspect of the inner threads. This would suggest that screws can be strengthened by shortening the length of the internal threaded portion of the sliding screw and by making certain that the inner end of the threaded portion of the lag screw lies within the barrel.

INTRAMEDULLARY DEVICES

ENDER NAIL

Ender (1970), reported use of multiple flexible condylocephalic

nails that were introduced through the distal femur for the stabilization of the intertrochanteric fractures without opening the fracture site.

Raugstad and colleagues (1979) and Kuderna and associates (1976), found that 70% and 50% of patients, respectively had rotational deformity after fixation with Ender nail. In addition to malrotation, knee pain, stiffness and supracondylar fractures have been reported as significant complications of Ender nail.

Chapman and associates (1981), reported comlications of Ender nailing.

1. Nail backing out of the medullary canal.
2. Perforation of the nails through the femoral head.
3. Rotation deformity at the fracture site.

Sherk and Foster (1985), reported high incidence of varus deformity and knee pain caused by distal migration of the Ender pins in intertrochanteric fractures.

Nungu and colleagues (1991), reported complications and re operation rates after treatment of intertrochanteric fractures with the Ender nails twice as high as those in patients treated with sliding compression hip screws.

Barrios and associates (1992), comparing Ender nails and

a sliding compression hip screw for intertrochanteric fractures, reported that quality of reduction, not the type of device or the stabililty of fracture, are the most important factor in determining results in these patients.

HARRIS NAIL

Harris (1980), designed a intramedullary device to prevent external rotation deformity and distal nail migration noted with Ender nails.

Skerk and Foster (1985), compared use of Harris condylocephalic nail with that of a sliding compression hip screw in the treatment of intertrochanteric fractures. There was a 51% loss of rigid fixation in patients with the condylocephalic nail, and in these patients deformity developed. In contrast there was no failure of fixation in patients treated with sliding compression hip screw. The authors concluded that sliding compression hip screw is better implant for these fractures.

GAMMA NAIL

Bridle and coworker (1991), compared the dynamic hip compression screw with the Gamma nail in hundred intertrochanteric fractures of the proximal femur.

They reported the occurence of four fractures close to the Gamma nail during the post operative period.

They recommended the use of the Gamma nails for

intertrochanteric fractures with the sub trochanteric extension and for intertrochanteric fractures with reverse obliquity.

Lindsey and colleagues (1991), concluded that the distal screw holes in the Gamma nail were stress riser. They recommended using the Gamma nail only to increase stability in unstable fractures.

Leung and colleagues (1992), compared the use of the Gamma nail and dynamic hip screw for treatment of intertrochanteric fractures. They found that the Gamma nail was associated with shorter operative time, smaller incision, less bloos loss and a quicker return to full weight bearing. Although there was no difference in mortality at 6 months, there were more intraoperative complications with the Gamma nail. Two patients of the one hundred thirteen patients in the study suffered a fracture below the tip of the nail. No such fractures was reported with the use of the dynamic hip screw.

William and Parker (1992), also reported two femoral shaft fractures near the tip of the Gamma nail.

Radford and coworkers (1993), compared the Gamma nail and dynamic hip screw. They reported high incidence of femoral shaft fractures with use of the Gamma nail. According to the authors, the femoral shaft fractures resulted from a consistent mismatch between shape of nail and the proximal femur.

Because of high rate of femoral shaft fractures, they did not recommend the use of the Gamma nail in the treatment of intertrochanteric fractures.

Goldhagen and associates (1994), in a comparative study of compression hip screw and the Gamma nail, demonstrated similar clinical results in two treatment groups.

Intramedullary methods of therapy for intertrochanteric fractures require extensive operative experience with the techniques and expensive operative equipment, including image intensification. The high incidence of complications reported with their use has resulted in loss of popularity of these devices.

PROSTHETIC HEMIARTHROPLASTY

Rosenfeld and colleagues (1973), reported the use of prosthetic replacement for intertrochanteric fractures of the femur in debilitated patients.

Stern and Goldstein (1977) also reported successful use of Lienbach prosthesis in select group of intertrochanteric fractures.

Pinder and associates (1981) and Heiman (1982), described the use of a Leinbach type femoral head- neck prosthesis in complex intertrochanteric fractures with excellent clinical results and a prompt return to preoperative status.

Stern and Angerman (1987), reported quicker restroration of function and shorter hospitalization for patients with comminuted

intertrochanteric fractures treated with Leinbach prosthesis as compared with those treated by open reduction and internal fixation.

Green and coworker (1987), reported the use of bipolar prosthetic replacement for unstable intertrochanteric fractures in elderly patients.

Haentjens and associates (1989), reported primary bipolar arthroplasty in patients more than seventy five years of age with unstable intertrochanteric fractures.

Broos and colleagues (1991), suggested that complex multifragment intertrochanteric fractures might be better treated with endoprosthesis primarily.

Material & Methods

A Treatise of Constitu

MATERIAL AND METHODS

This study was conducted in the Department of Orthopaedics, M.L.B. Medical College, Hospital, Jhansi. The patients for this study were selected from those attending the Out patient department of Orthopaedics and from those arriving at emergency department of M.L.B. Medical College, Hospital, Jhansi from Nov. 98 to Nov. 99.

All the patients were subjected to detailed history, clinical examination, necessary radiological and pathological investigations.

Criteria for selection of cases

Following cases were selected for conservative treatment:

1. Patients who were non ambulatory prior to fracture.
2. Patients with terminal illness, who were poor risk for open reduction and internal fixation e.g. patients with severe anaemia, poor cardiovascular and pulmonary status.
3. High risk cases for anaesthesia.
4. Osteoporotic patients.

Following cases were selected for internal fixation with Dynamic Hip Screw.

1. Patients who were ambulatory prior to fracture.
2. Patients who were in stable medical condition to tolerate the stress of surgery and anaesthesia.

METHOD

Evaluation of patients

1. **History** : Name, age, sex, side of fracture, mode of injury, duration of injury, associated injury, past history of major illness.

2. ***Clinical Assessment of Patients*** : General condition of patients, vital signs, examination of cardiovascular system and respiratory system for fitness for anaethesia.

3. ***Local Examination*** : Examination of the injured hip, assessment of neurovascular status of distal limb and associated injuries.

4. ***Radiological Examination*** : Anteroposterior view of x-ray pelvis with both hip with both lower limb in full internal rotation and lateral view of injured hip to assess the type of fracture and bone quality.

5. ***Routine Investigations***

Hb gm%, BT, CT

TLC, DLC, ESR

Urine (R/E),(M/E)

Blood urea

Blood Sugar

Serum Creatinine

ECG and X-Ray chest-PA in relevant cases

Blood group and cross matching

6. ***Initial Management*** : Shock, if present, managed by intravenous fluids, plasma expander and blood transfusion if necessary.

Buck Traction was applied immediately and limb was immobilized on Thomas splint.

After general condition of patients was stabilized, radiological and routine investigations were carried out.

CONSERVATIVE TREATMENT

In conservative regeim, upper tibial skeletal traction or below knee skin traction was applied for three to four weeks and limb was immobilized on Thomas splint in neutral rotation and slight abduction. Isometric quadricep excercises were strated immediately. Analgesics were given for four to five days after which pain and swelling usually subsided.

All the patients were subjected to regular clinical examination to observe any complication of traction and recumbency. After three to four weeks anteroposterior and lateral roentgenograms of the injured hip were taken. Usually fracture became "sticky" by that time and traction was removed followed by application of derotation bar or one and half hip spica for another two to two and half months to allow fracture consolidation.

Follow up : Patients were evaluated clinically and radiologically at one month, one and half months, three months and at six months. All relevant data was collected and tabulated so as to reach the final results. Partial weight bearing was started at three months and progressively increasing to full weight bearing at six months. X-ray were taken regularly to evaluate fracture union and neck-shaft angle.

INTERNAL FIXATION BY DHS

Implants and Instruments

For internal fixation of Intertrochanteric fractures following instruments were used.

(A) **Implant**

1. DHS lag screw
2. Compression screw

3. 135° DHS barral plate

4. 4.5mm cortical screws

(B) **Special Instruments**

1. Guide wire of 2.5mm diameter

2. Angle guide of 135°

3. Direct measuring device

4. Triaction reamer

5. DHS Tap

6. DHS Wrench

7. Centering sleeve for tap

8. Centering sleeve for DHS wrench

9. Coupling screw for removal

11. Guide shaft

12. Impactor

13. Quick-coupling T-Handle

(C) **General Instrument**

1. A.O. clamp

2. Hand Drill
3. 3.2mm drill bit
4. Depth gauge
5. 4.5mm tap with tap sleeve
6. 4.5mm screw driver
7. B.P. handle with surgical blade No. 23
8. Bone lever
9. Artery forcep

Technique

Anaesthesia : Patients were given anaesthesia usually spinal, epidural or general.

Patient Positioning : Patients were positioned supine on fracture table. The uninjured lower extremity was held in wide abduction by a foot plate or boot attached to one of the leg extensions of the fracture table. The injured lower extremity is held by a foot plate or boot attached to the other leg extension of the fracture table.

Draping : The skin over the hip was prepared after ten minutes soap scrub and application of the usual antiseptic so-

lutions. The lateral aspect of the hip from the iliac crest to the distal thigh was squared off with towels and drapes.

Reduction Techniques : Closed reduction of the fracture was performed by applying traction to the injured lower extremity in neutral or slight internal rotation and slight abduction. Check the reduction by anteroposterior and lateral roentgenograms, paying special attention to cortical contact medially and posteriorly.

Exposure : Lateral approach to the proximal femur from the greater trochanter extending distally was used. The length of incision depended on length of the implant used.

Insertion of Guide wire

Point of Entery : Point opposite the tip of lesser trochanter, two centimeter distal to vastus lateralis ridge on the lateral surface in the midline of the shaft of the femur.

Angle of Version : Version guide wire was inserted by hand onto the anterior surface of femoral neck till it impacts the flare of head.

Insertion of final guide wire

1. 3.2 mm drill bit was used to perforate the lateral cortex at the appropriate site of entery.
2. A 2.5mm threaded tip guide wire (230mm) was inserted

through 135° angle guide so that it was parallel to the version guide wire in the axial plane.

3. The guide wire was inserted till it reached the sub chondral bone. The central position of guide wire was confirmed by an anteroposterior and lateral roentgenogram.

Reaming of Femur

Direct measuring device was used to read-off the depth of wire within the bone. The reamer was set 10mm short of the depth of guide wire within the bone. A quick coupling T-Handle was used for manual reaming. The 'Triple' reamer is designed to accurately and simultaneously ream for the lag screw, the barrel and plate barrel junction. If guide wire was inadvertently pulled out with the reamer, it was reinserted using short centering sleeve and DHS lag screw used in reverse which allowed exact relocation of the central axis of the reamed tract.

Tapping : Tapping was not done in osteoporotic bone, but in young patients tapping was done to avoid excessive torque on the insertion wrench and to minimise the risk of inadvertent malrotation of the femoral head fragment during final seating of screw.

Tap was slided into short centering sleeve and mounted

onto the quick coupling T-handle. The completed tap assembly was slided onto the guide wire and used to tap the threads for DHS lag screw.

Selection of lag screw

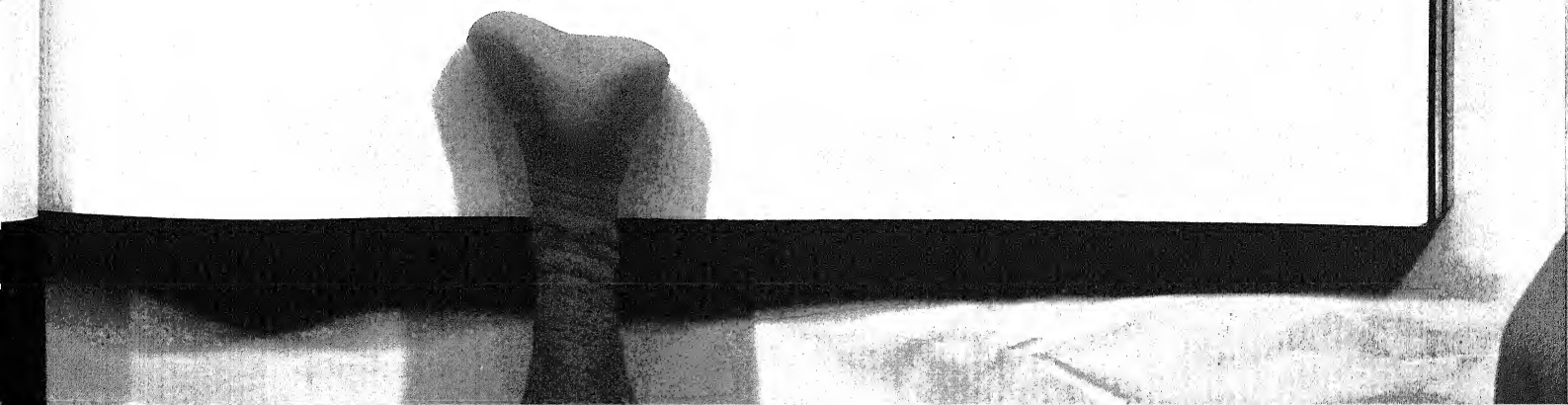
A lag screw of length 5mm shorter than the reamed length is selected.

Insertion of DHS screw

The coupling screw was inserted through the guide shaft and threaded onto the selected DHS screw. The entire assembly was then slided into the insertion wrench. The insertion wrench was used with long centering sleeve. The DHS screw was inserted upto -5mark of the insertion wrench. The T-handle of wrench was parallel to the femoral shaft at the end of screw insertion. The guide wire was then withdrawn by turning it anticlockwise.

Insertion of barrel plate

The insertion wrench was pulled out and the selected barrel plate was slided over the guide shaft onto the lag screw, the coupling screw and guide shaft were then uncoupled and the nylon tipped impactor was used to seat the barrel plate.



Fixation of plate to femur

The barrel plate was then fixed to the femur using 4.5mm cortical screws.

Insertion of compression screw

The compression screw was inserted after the plate was fixed to bone after loosening of the traction. It was tightened against the rim of the barrel plate to achieve compression.

Finally the wound was closed in layers over suction drain. No external splintage was done.

Post operative care

1. The patient was allowed to sit in a chair the day after surgery and active exercises of knee, hip and ankle were started for muscle strengthening.
2. Short course of antibiotics and analgesics were given for four to five days.
3. Drain was removed after forty eight hours.
4. Anteroposterior and lateral check x-rays of operated hip was taken to see quality of reduction, neck shaft angle and placement of lag screw and barrel plate.
5. Stitches were removed at twelve to fourteen days.

6. If reduction and internal fixation was stable, partial weight bearing was started with help of walker within one to two weeks of operation.

7. In unstable fracture, only touch down weight bearing was started.

8. Full weight bearing was started after radiological union, twelve to sixteen weeks after operation.

Follow up : Follow up was done regularly upto six months after surgery. During follow up patients were evaluated clinically and radiologically for assessment of progress and any complication if occur.

All relevant data were collected and tabulated so as to such final result

1. Pain
2. Limp
3. Range of motion of hip and knee
4. Ability to walk with or without support
5. Ability to squat and sit cross legged
6. Shortening

Evaluation of the results

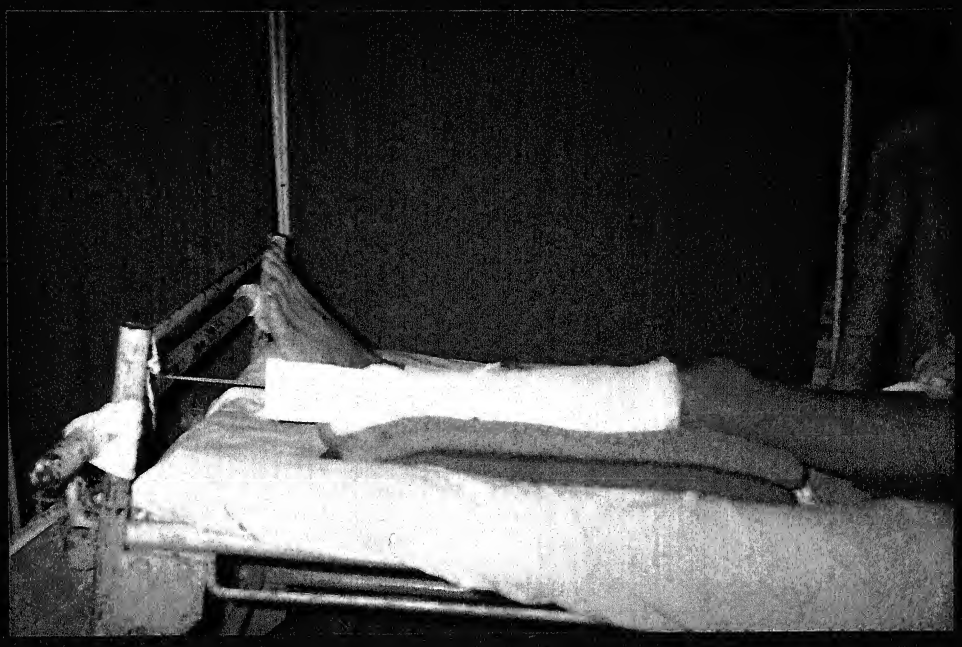
The results will be evaluated and graded as excellent, good and poor as per criteria of kyle (1979).

(a) Excellent : No pain, minimum limp, normal range of motion, can walk without support, can squat and sit cross legged, no shortening.

(b) Good : Occasional mild pain, noticable limp, acceptable range of motion, can walk with the help of cane, can squat and sit cross-legged, shortening less than two cm..

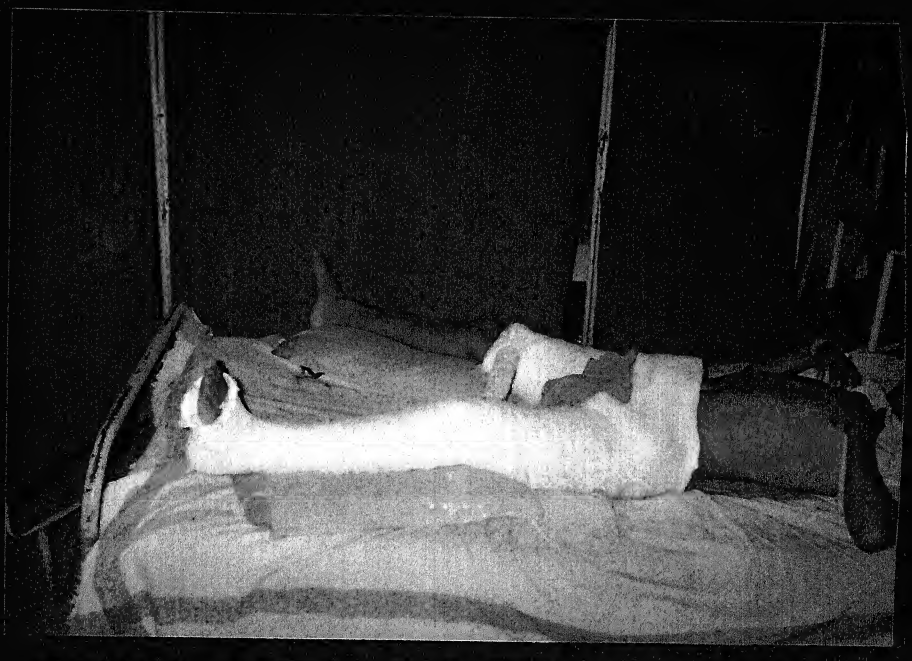
(c) Poor : Moderate pain, marked limp, limited range of motion, cann't walk, cann't squat and sit cross-legged, shortening more than two cm.

Photograph showing Upper Tibial Skeletal traction

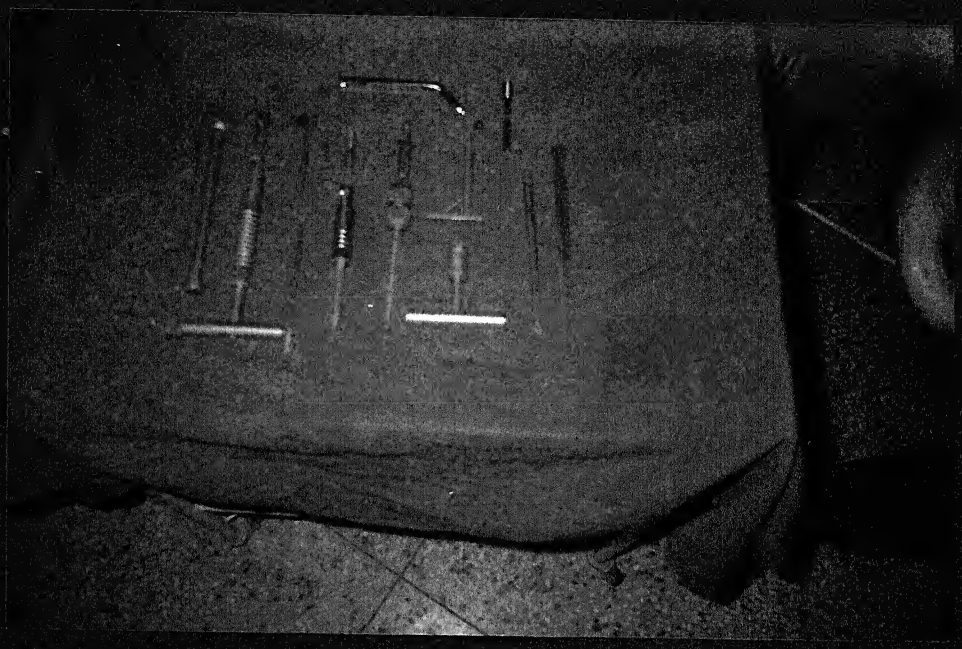


Photograph showing Below Knee Skin traction

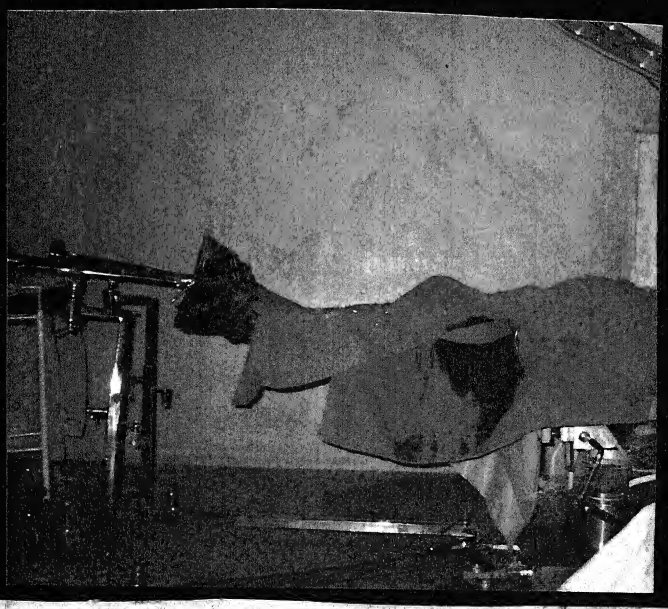
Photograph showing Derotation Bar



Photograph showing One and half Hip Spica



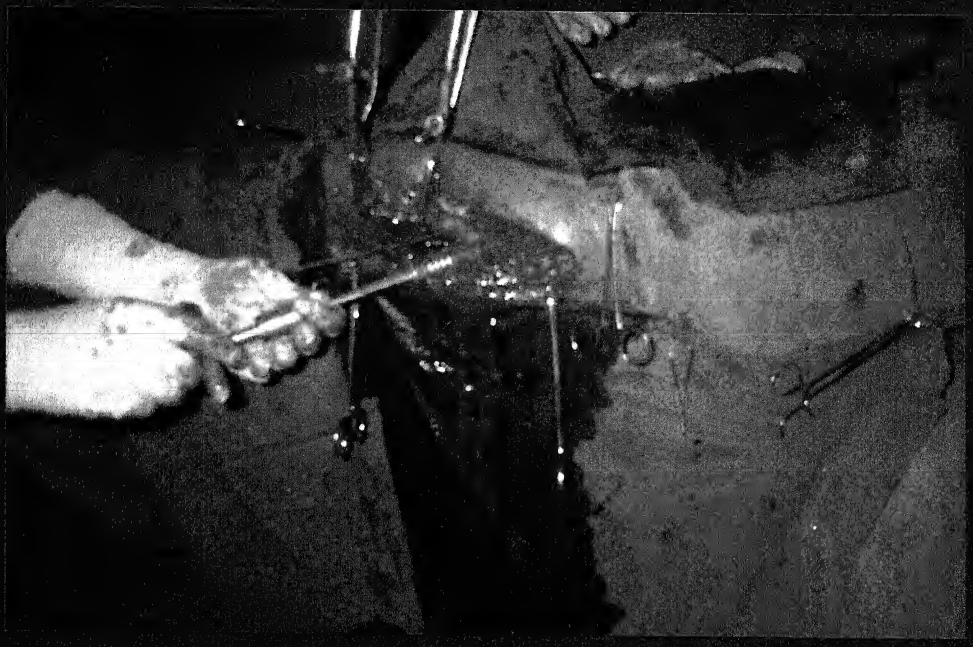
Photograph showing Instruments and Implants for DHS fixation



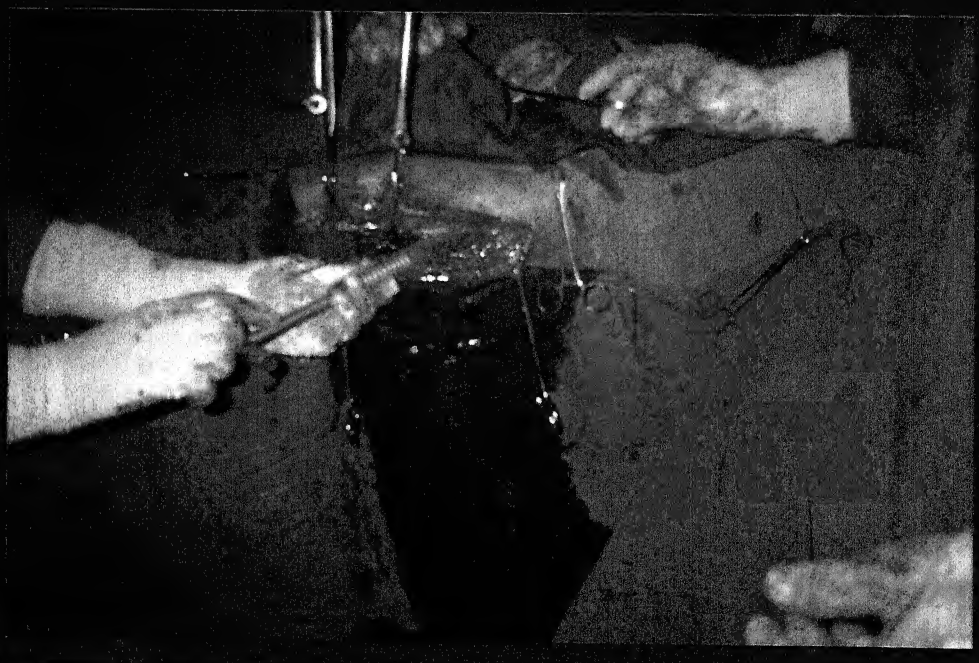
Photograph showing Patient on fracture table

Photograph showing Insertion of Guide wire for DHS

Photograph showing Reaming of femur with Triaction Reamer



Photograph showing Tapping of femur with DHS Tap



Photograph showing Insertion of DHS screw with DHS wrench

Photograph showing Insertion of Compression screw

Photograph showing Final DHS implant in place

Observations

OBSERVATIONS

The present study was conduted in the Department of Orthopaedics, M.L.B. Medical College, Jhansi. This study included 40 patients of Intertrochanteric fractures of the femur, out of which 30 patients were treated by conservative methods and 10 patients were treated by internal fixation with Dynamic hip screw (D.H.S.). Those patients treated by conservative methods were designated as Group I and those treated by intrenal fixation with Dynamic hip screw designated as Group II. Important facts and relevant observation details were collected, and necessary calculation were done. This data was arranged in a tabulated form, and is being presented as follows.

TABLE - I

Showing methods of treatment given

Treatment	Group	No. of patients	Percentage
Conservative	I	30	75.00
D.H.S.	II	10	25.00
Total		40	100.00

Out of 40 patients of intertrochanteric fracture of the femur 30 (75%) patients were treated by conservative methods and 10 (25%) patients were treated by internal fixation with dynamic hip screw.

Age and Sex incidence

Out of 40 cases majority of patients were males, 28 (70%) and females were only 12 (30%). Sex distribution did not differ too much in both groups of patients with 66.6% males in Group I and 80% males in Group II. Overall male female ratio was 7:3.

The youngest of the patients was 25 years old boy, and the eldest one was 92 year old elderly female patient. Most of patients in Group I were in age group between 61-80 years and between 41-60 years in Group II. Average age overall came out to be 53.57 years and that of Group I 53.53 years and Group II 53.70 years. Thus average age was not significantly different in both groups of patients. Details of age and sex distribution are shown in following tables.

TABEL - II

Age distribution of patients

Age Years	Group I		Group II		Overall	
	No. of cases	%	No. of cases	%	No. of cases	%
20-40	06	20	02	20	08	20
41-60	08	26.6	06	60	14	35
61-80	12	40	02	20	14	35
81-100	04	13.3	--	--	4	10
Total	30	100	10	100	40	100

TABLE - III

Sex distribution of patients

Sex	Group I		Group II		Overall	
	No. of cases	%	No. of cases	%	No. of cases	%
Male	20	66.6	8	80	28	70
Female	10	33.3	2	20	12	30
Total	30	100	10	100	4	100

Side of limb : Out of 40 cases, 22 (55%) patients had fracture of right side while 18 (45%) patients had fracture of left side. Right side dominated in Group I with 18 (60%) cases and left side dominated in Group II with 6 (60%) cases. Details are shown in following table.

TABLE - IV

Side of limb

Side of Limb	Group I		Group II		Overall	
	No. of cases	%	No. of cases	%	No. of cases	%
Right	18	60	4	40	22	55
Left	12	40	6	60	18	45
Total	30	100	10	100	40	100

Mode of injury : Out of 40 cases, 32 (80%) cases were due to injury caused by fall and 8 (20%) cases were due to road traffic accident. Injury due to fall was offending cause in elderly patients while in young patients road traffic accident was offending cause.Statistics were similar in both the Group I & Group II. Details are shown in Table -V.

TABLE - V

Mode of injury

Mode of injury	Group I		Group II		Overall	
	No. of cases	%	No. of cases	%	No. of cases	%
Injury due to fall	24	80	8	80	32	80
Road traffic accident	6	20	2	20	08	20
Total	30	100	10	100	40	100

Occupation of the patients :

Out of 40 cases, maximum were farmers 11 (27.5%) and elderly dependents 9 (22.5%). Amongst the rest, 9 (22.5) were bussiness men, 6 (15%) were housewives, 3 (7.5%) were teachers and 2 (5%) were government employes. Details are shown in Table- VI.

TABLE - VI

Occupation of the patients

Occupation	Group I		Group II		Overall	
	No. of cases	%	No. of cases	%	No. of cases	%
Farmer	8	26.6	3	30	11	27.5
Elderly dependent	7	23.3	2	20	9	22.5
Housewife	6	20.0	--	--	6	15.0
Bussiness men	5	16.6	4	40	9	22.5
Teacher	2	6.6	1	10	3	7.5
Government employee	2	6.6	--	--	2	5.0
Total	30	100	10	100	40	100

Pattern of fracture : In our study intertrochanteric fractures have been classified into stable and unstable fractures.

Boyd and Griffin type I and type II fractures are stable fractures and type III and type IV fractures are unstable fractures. The distribution of stable and unstable fractures in group I and group II are shown in Table - VII.

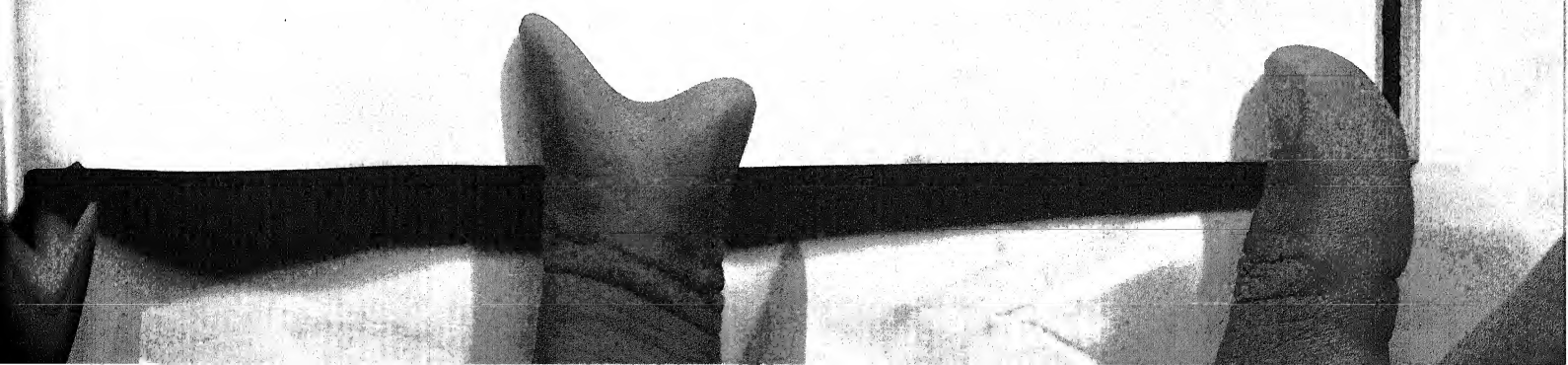


TABLE VII

Pattern of fracture

Pattern of fracture	Group I		Group II		Overall	
	No. of cases	%	No. of cases	%	No. of cases	%
Stable	8	26.6	2	20	10	25
Unstable	22	73.3	8	80	30	75
Total	30	100	10	100	40	100

In our study of 40 cases, unstable fractures constitute 30(75%) cases whereas stable fractures constitute only 10(25%) cases. The incidence of unstable fractures was nearly similar in both groups, 22(73.3%) cases in Group I and 8(80%) in Group II.

Associated past illness

Out of 40 cases in the present study, 26 (65%) patients had no past illness. Only 14 (35%) patients were suffering from associated past illness. In group I hypertension was present in 4 (13.3%) patients, Ischemic heart disease in 3 (10%) patients, chronic obstructive pulmonary disease in 3(10%) patients, chronic renal failure in one (3.3%) patient and diabetes mellitus in one (3.3%) patient.

In group II only 2 (20%) patients were suffering from mild hypertension. Details are shown in following table.

TABLE - VIII

Associated past illness

Assoicated past illness	Group I		Group II		Overall	
	No. of cases	%	No. of cases	%	No. of cases	%
Hypertension	4	13.3	2	20	6	15
Ischemic heart disease	3	10.0	--	--	3	7.5
Chronic obstructive pulmonary disease	3	10.0	--	--	3	7.5
Chronic renal failure	1	3.3	---	--	1	2.5
Diabetes mellitus	1	3.3	--	--	1	2.5
No past illness	18	60	8	80	26	65
Total	30	100	10	100	40	100

Associated injuries : Most of the cases, 36 (90%) had no associated injuries. Only 4 (10%) cases had fractures of other bones. In Group I only 2 (6.6%) cases had fracture of both bone of forearm and only one (3.3%) case had fracture of pelvis. In Group II only one (10%) case had colles fracture of left radius. The details are shown in Table - IX

TABLE - IX

Associated injuries

Associated injuries	Group I		Group II		Overall	
	No. of cases	%	No. of cases	%	No. of cases	%
Fracture of both bone of forearm	2	6.6	--	--	2	5
Fracture pelvis	1	3.3	--	--	1	2.5
Colles fracture	--	--	1	10	1	2.5
Head & Facial injury	--	--	--	--	--	--
Chest & Abdominal injury	--	--	--	--	--	--
No associated injury	27	90	9	90	36	90
Total	30	100	10	100	40	100

Time interval between injury and admission : Most of cases 35 (87.5%) were admitted within 1 week of injury and 5 (12.5%) cases were admitted within 2 week of injury. In Group I, 27 (90%) cases were admitted within 1 week of injury and in Group II, 8 (80%) cases were admitted within 1 week of injury. The details are tabulated as follows.

TABLE - X

Time interval between injury and admission

Time interval (weeks)	Group I		Group II		Overall	
	No. of cases	%	No. of cases	%	No. of cases	%
Within 1 week	27	90	8	80	35	87.5
Within 2 week	3	10	2	20	5	12.5
Within 3 week	--	--	--	--	--	--
Total	30	100	10	100	40	100

Time interval between injury and surgery

In Group II, out of 10 patients, who were treated by internal fixation by D.H.S., most of pateints 6(60%) were operated within 0-1 week of injury. 2 (20%) patients were operated within 1-2 weeks of injury and 2 (20%) patients were operated within 2-3 weeks of injury. The details are tabulated as follows:

TABLE - XI

Time interval between injury and surgery (internal fixation by D.H.S.)

Time interval (weeks)	No. of cases	Percentage
0-1	6	60
1-2	2	20
2-3	2	20
Total	10	100

Various types of Anaesthesia used in surgery : Out of 10 cases, most of cases 8(80%) were operated under spinal anaesthesia, one(10%) case was operated under epidural anaesthesia and one (10%) case was operated under general anaesthesia. The details are shown in following table.

TABLE - XII

Various types of Anaesthesia used in surgery

Type of Anaesthsia	No. of cases	Percentage
Spinal	8	80
Epidural	1	10
General	1	10
Total	10	100

Post operative hospital stay : The patients were allowed to sit in a chair the day after surgery, and active exercises of hip, knee and ankle started. Injectable antibiotics were continued for around five or six days post operatively which were replaced by oral antibiotics for around ten more days for most of the patients. Sutures were removed in most of the patients by 10^{th} or 12^{th} day post operatively, after which within a day or two patients were discharged. The average hospital stay

of patients overall, was 20 days.

Conservative methods used in Group I : In Group I, 30 patients were treated by various conservative methods. Traction was applied initially in all patients for three to four weeks, upper tibial skeletal traction was applied in 24 (80%) cases and below knee skin traction in 6 (20%) cases and limb was immobilized on Thomas splint in neutral rotation and slight abduction. Isometric Quadricep exercises were started immediately. Analgesics were given for four to five days after which pain usually subsided.

All the patients were subjected to regular clinical examination to observe complications of traction & recumbency namely pintract infection in skeletal traction, peroneal nerve palsy in skin traction, bed sore, chest infection, urinary tract infection, deep vein thrombosis etc.

After three to four weeks, anteroposterior and lateral roentgenograms of the injured hip were taken. Usually fracture became "sticky" by that time and traction was removed and derotation bar was applied in 24 (80%) cases and one and half hip spica in 6 (20%) cases for another two to two and half months to allow fracture consolidation. The details of conservative treatment are tabulated in following tables.

TABLE - XIII

Types of traction applied

Type of traction applied	No. of cases	Percentage
Upper tibial skeletal traction	24	80
Below knee skin traction	6	20
Total	30	100

Table XIV

Methods of Immobilization

Methods of immobilization	No. of cases	Percentage
Derotation bar	24	80
One & half hip spica	6	20
Total	30	100

Total duration of immobilization : In Group I all cases were immobilized for about twelve to fouteen weeks. This long period of recumbency was responsible for most of complications seen in Group I. Whereas all cases in Group II were mobilized the day after surgery. Details are shown in table-XV.

TABLE - XV

Duration of immobilization

Treatment Group	Duration of immobilization
Group I	12-14 weeks
Group II	10-15 days

Complications : There were only two (20%) cases of superficial infection and shortening less than two cm in Group II. In Group I, pressure sore occured in 10 (33%) cases, respiratory tract infection in 6 (20%) cases and urinary tract infection in 3 (10%) cases while there was no such complication seen in Group II. In Group I, Coxa vara occured in 24 (80%) cases shortening <2cm in 6 (20%) cases, shortening >2cm in 24 (80%) cases and knee stiffness occured in 24 (80%) cases. No such complication was found in Group II. No case of non union and deep vein thrombosis was reported in either Group.

The various complications of treatment are tabulated as follows-

TABLE XVI

Complications of treatment

Complication	Group I		Group II		Overall	
	No. of cases	%	No. of cases	%	No. of cases	%
Superficial infection	--	--	2	20	2	5.0
Deep infection	--	--	--	--	--	--
Pressure sore	10	33	--	--	10	25.0
Respiratory tract infection	6	20	--	--	6	15
Urinary tract infection	3	10	--	--	3	7.5
Deep Vein thrombosis	--	--	--	--	--	--
Knee stiffness	24	80	--	--	24	60
Coxa vara	24	80	--	--	24	60
Shortening <2 cm	6	20	2	20	8	20.0
Shortening >2cm	24	80	--	--	--	--
Non union	--	--	--	--	--	--

Follow up : Follow up of all the cases in Group I and Group II were carried out regularly at one month, one and half months, three months and at six months. Patients were evaluated clinically and radiologically for assessment of progress

& any complication if occur.

Clinical follow up : All cases were evaluated clinically for following criteria upto six months.

1. Pain
2. Limp
3. Ability to squat and sit cross legged
4. Ability to walk with or without support
5. Range of motion of hip and knee
6. Shortening

Radiological follow up

All the patients were evaluated radiologically at regular interval to assess the progress of union and neck shaft angle and any failure of implant in Group II patients.

Time of osseous union

In Group I union occured in twelve to fourteen weeks while in Group II occured in ten to twelve weeks. The data is tabulated in following table.

TABLE - XVII

Time of osseous union

Treatment	Period in weeks
Group I	12-14 weeks
Group II	10-12 weeks

Neck shaft angle : In Group I, there was loss of neck shaft angle in 24 (80%) cases. Only 6(20%) cases had normal neck shaft angle. In group II all patients had normal neck shaft angle and there was no failure of implant in any case of Group II. Details are shown in Table - XVIII.

TABLE - XVIII

Neck shaft angle

Neck shaft angle	Group I		Group II	
	No. of cases	%	No. of cases	%
100-110	15	50	--	--
111-120	9	30	--	--
121-130	6	20	8	80
131-140	--	--	2	20
Total	30	100	10	100

FINAL EVALUATION OF THE RESULTS

After six months the results were evaluated and graded as excellent, good and poor as per criteria of Kyle (1979).

In Group I, 4 (13.34%) cases had excellent results, 6 (20%) case had good results, 20 (66.6%) cases had poor results.

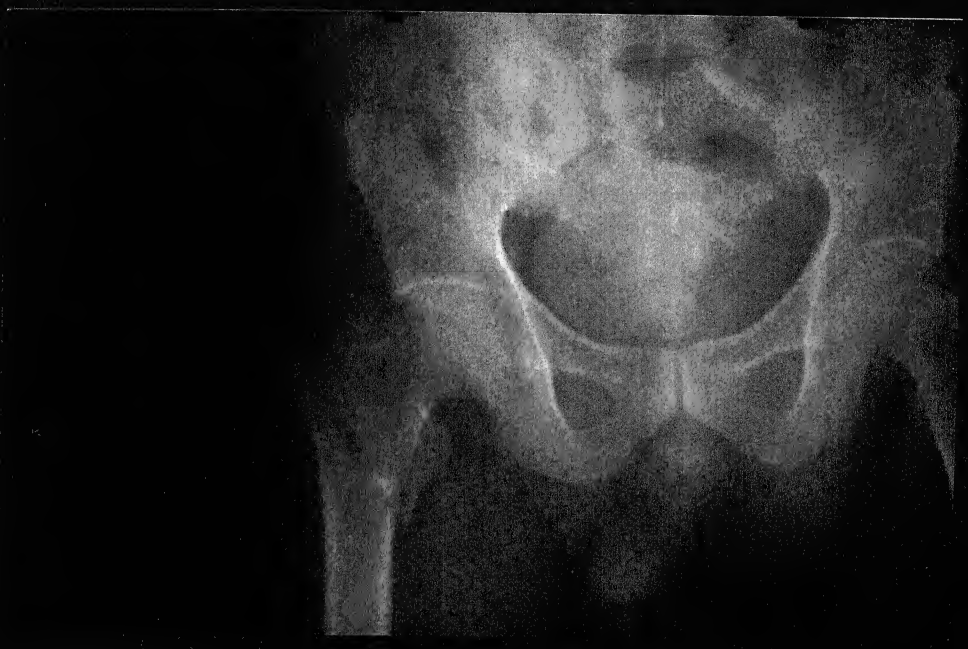
In Group II 8 (80%) cases had excellent results and 2 (20%) cases had good results. There was no poor result in Group II. The details are shown in following table.

TABLE - XIX

Final Results

Result	Group I		Group II	
	No. of cases	%	No. of cases	%
Excellent	4	13.3	8	80
Good	6	20	2	20
Poor	20	66.6	--	--
Total	30	100	10	100

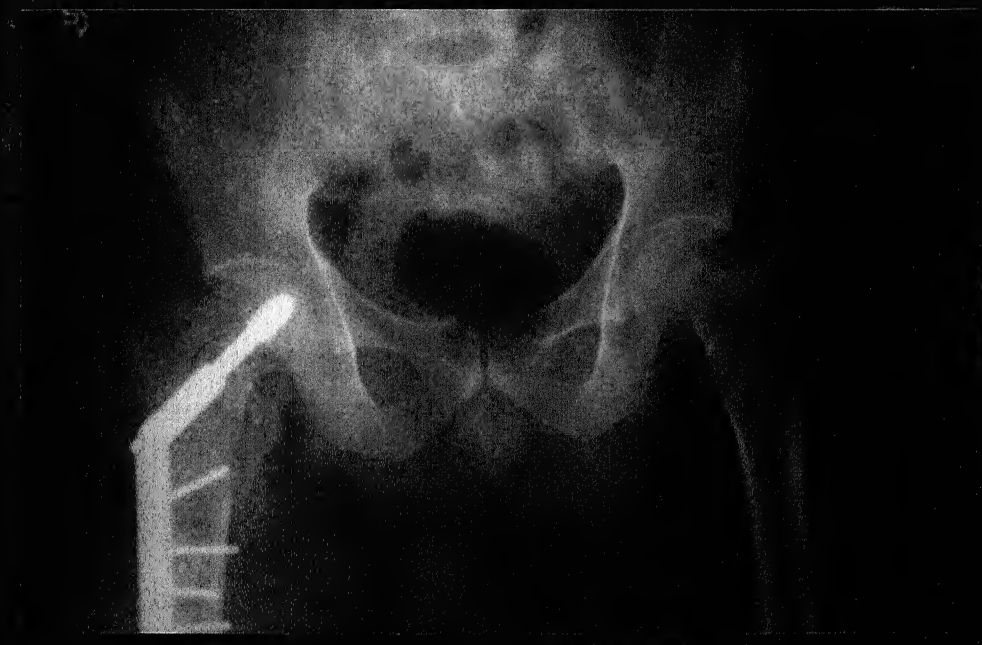
Case A Group-II
Pre-operative Radiograph showing Boyd & Griffin type-II
Intertrochanteric fracture to be treated by DHS fixation



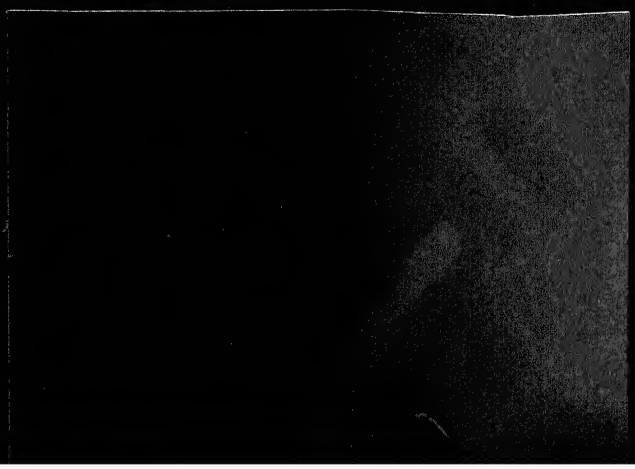
A.P. View

Lateral View

Immediate Post-operative Radiograph showing adequate reduction and internal fixation with DHS

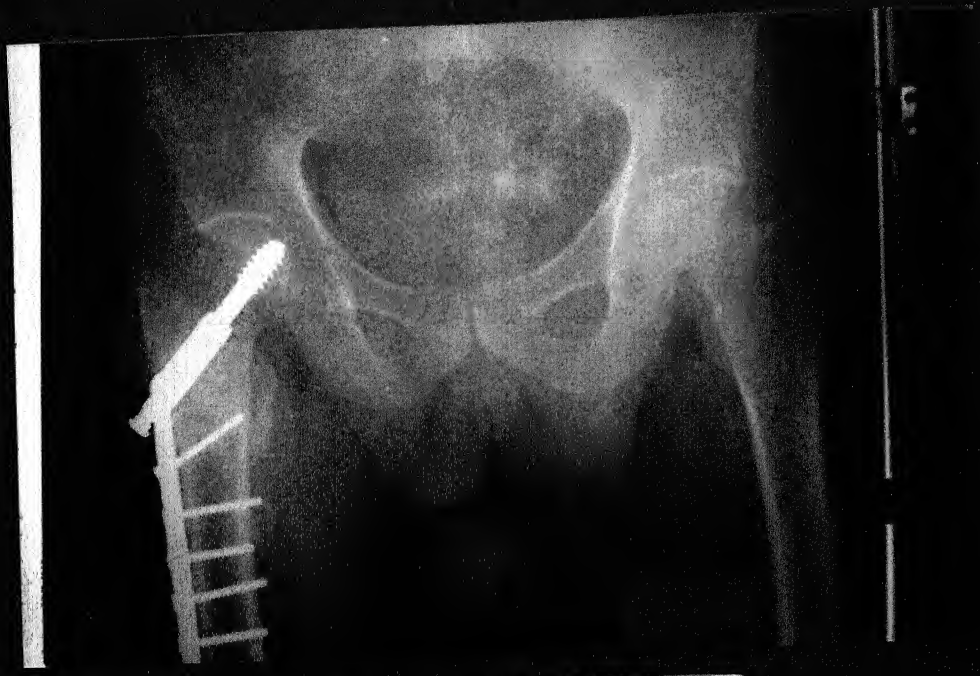


A.P. View



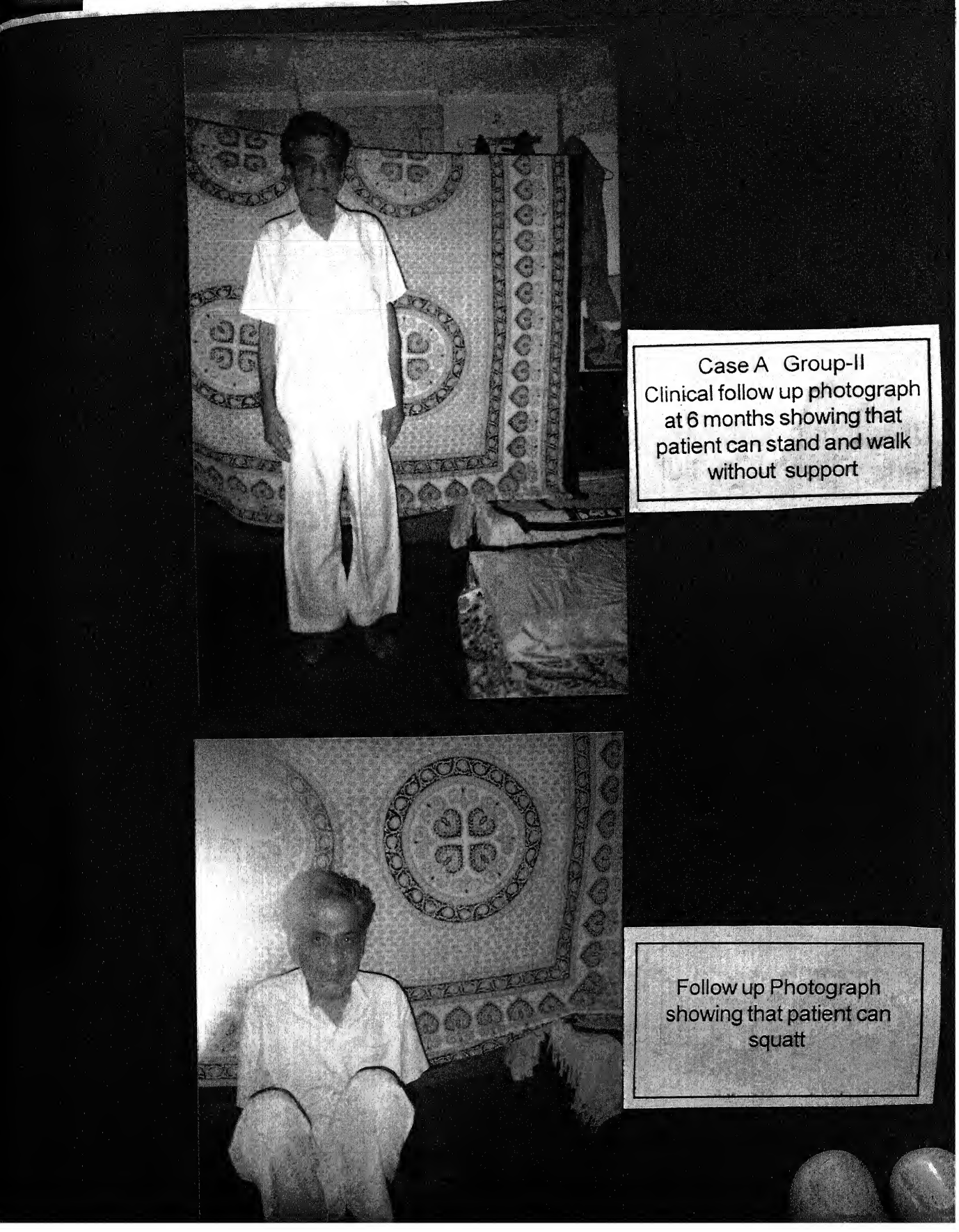
Lateral View

Follow up Radiograph at 6 months showing fracture union in Anatomical position



A.P. View

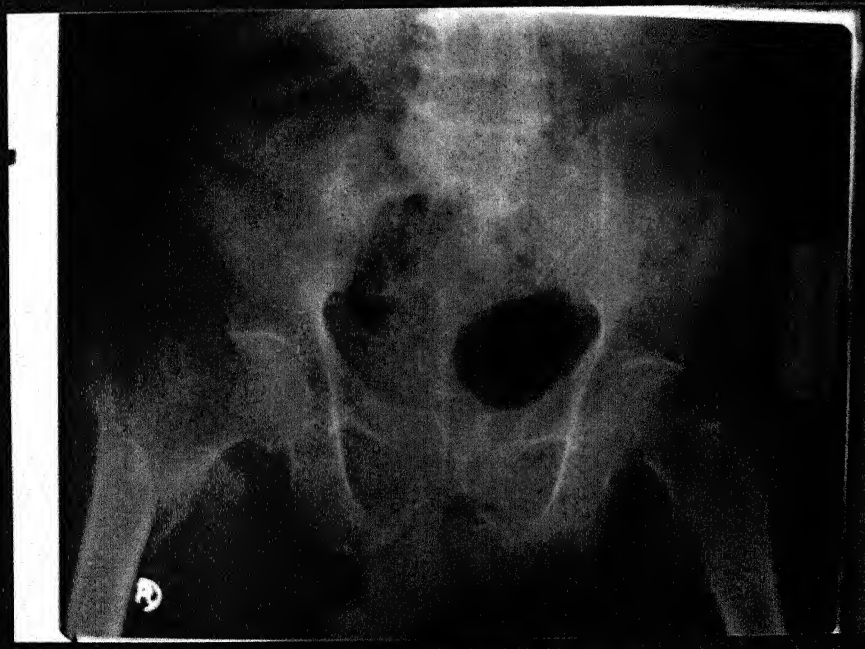
Lateral View



Case A Group-II
Clinical follow up photograph at 6 months showing that patient can stand and walk without support

Follow up Photograph showing that patient can squatt

Case A Group-I
Radiograph showing Boyd & Griffin Type-II
Intertrochanteric fracture to be treated by Hip spica



A.P. View

Lateral View

Follow up Radiograph at 6 months showing fracture union in acceptable position after treatment with Hip spica

A.P. View

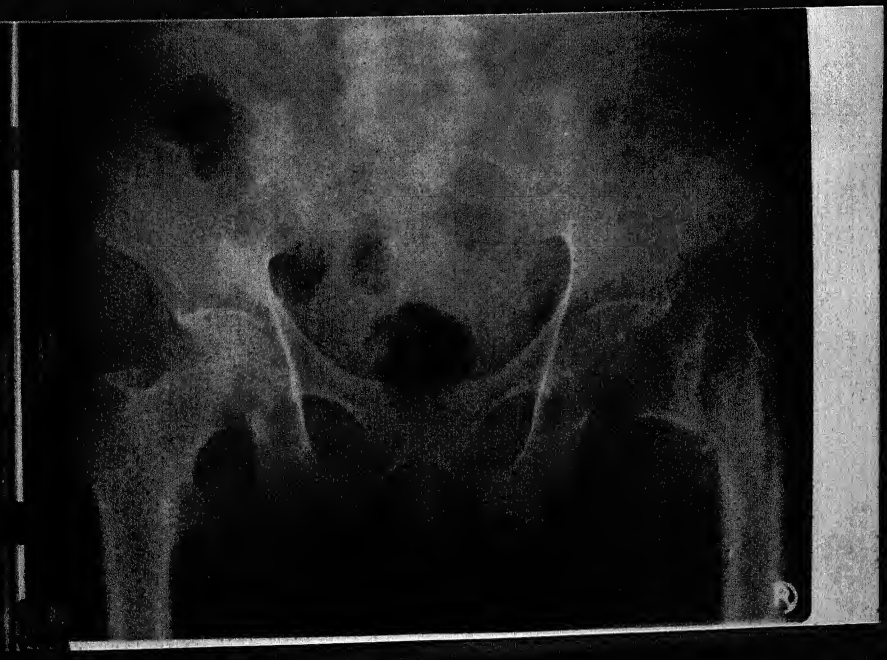
Lateral View

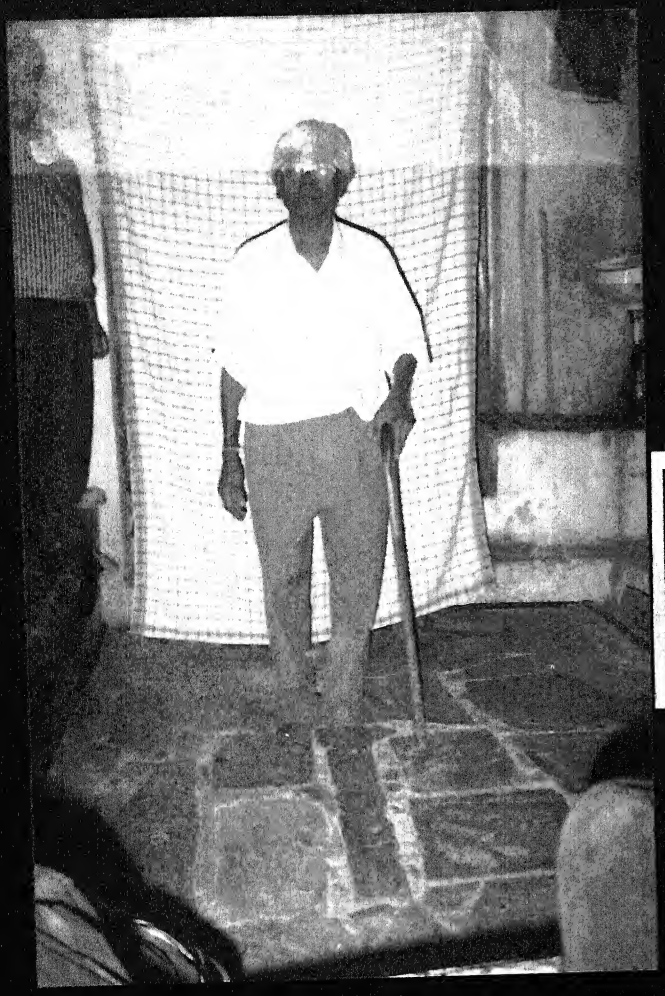
Case A Group-I
Clinical follow up photograph at 6 months showing that patient can stand and walk without support

Follow up photograph showing that patient cannot squatt

Case B Group-I
Radiograph showing Boyd & Griffin type-III
Intertrochanteric fracture to be treated by Derotation bar

Follow up Radiograph at 6 months showing malunited fracture with Coxa vara after treatment with Derotation bar





Case B Group-I
Clinical follow up photograph at 6 months showing that patient needs support with cane for walking

Follow up photograph showing that patient cannot squatt

Discussion

DISCUSSION

This study was conducted in the Department of Orthopaedics, M.L.B. Medical College on 40 cases of intertrochanteric fracture of the femur, which were treated by two different modalities i.e. by conservative methods and internal fixation with dynamic hip screw (DHS). Two groups were formed, Group I treated by conservative methods and GroupII treated by internal fixation with dynamic hip screw (DHS). The complete data was collected from the two groups and compared with each other and with previously done studies reported by various authors at different centres in the world.

The variable factors associated with patients in the two groups such as age, sex, mode of injury, type of fracture were compared so that results of treatment could be evaluated and compared properly.

While evaluating age distribution in this series of patient, the overall average age of patients came out to be 53.57 years. Average age of Group I was 53.53 years and that of Group II quite similar 53.70 years.

The average age in our study was about 10-12 years less than reported by different western authors.

Mulhollond and Gunn (1972) reported average age of 66-76 years in these patients. This discrepancy probably occured due to the fact that the average life expectancy in our country is quite less than that of western world.

These same sociocultural differences explains the lower percentage of females amongst injured cases. These fractures were found more in male patients as they are more exposed to external work. The ratio of women to men in our series was 3:7 while Clawson (1964) reported women to men ratio in the range of 2:1 to 8:1.

Considering the mode of injury in our series, out of 40 cases, injury due to fall accounted for 32(80%) cases and road traffic accidents accounted for 8(20%) cases. The distribution was somewhat similar to the series of cases reported by Clawson (1964) in which injury as a result of fall, involving both direct and indirect forces accounted almost invariably in majority of cases. Seeing the mode of injury as it is confirmed with previous literature this fracture is more common in older age group due to minor trauma.

Regarding the occupation of cases in our study, most of them were elderly dependent person (23.3%) and poor

farmers (26.6%). This distribution was somewhat similar to series of cases reported by Shaftan (1967) in which injury occured mostly in elderly person as a result of minor trauma.

While observing the type of fracture in our series of cases it was found that unstable fractures constituted 75% of all cases. In Group I 73.3% of cases had unstable fractures and in Group II 80% of cases had unstable fractures. This correlates with the finding of Jacobs and coworkers (1980) that incidence of comminuted unstable intertrochanteric fractures is increasing.

In our series of cases, 35% of all cases were suffering from associated past illness so as to perclude internal fixation in them. In Group I 40% of all cases were terminally ill therefore they were given conservative treatment. According to Friedenberg and colleagues (1972) patients with terminal illness, patients with old fracture and non-ambulatory patients who are comfortable with the fracture should receive conservative treatment. In Group II, two patients had mild hypertension that was controlled with antihypertensive drugs. They were operated after controlling hypertension.

In our series of cases in Group II, 60% of cases

were operated within first week of injury. Jensen et al (1960), recommended the need for urgent internal fixation of an intertrochanteric fracture and avoiding any unnecessary delays.

Murray (1949), claimed that trochanteric fractures treated conservatively by skin traction or Steinmann pin skeletal traction with Hamilton Russel traction has better results than any operation and that mortality is lower. However, Horowitz (1960), reported mortality rate of 34.6% for trochanteric fracture treated by traction and 17.5% for those treated by internal fixation. Thus, we set out in our study to compare the results of conservative methods and internal fixation by DHS in an intertrochanteric fracture of femur. For this out of 40 cases of an intertrochanteric fracture of the femur in our series, 30 cases were selected to be treated by conservative methods and 10 cases were selected to be treated by internal fixation with DHS.

Clawson et al (1957) used longitudinal skeletal traction in his series of cases of an intertrochanteric fracture of the femur. He stressed need to adjust rotation of the limb, to use serial x-rays to evaluate fracture reduction, and to encourage daily exercises. He noted early callus by third week. Partial weight bearing was started, when

radiological union occured, in ten to twelve weeks. In his series, 70% cases developed coxa vara, shortening and knee stiffness. There were secondary complications of recumbency such as pressure sore in 30% of cases, pneumonia in 16% cases and urinary tract infection in 8% of cases.

In our study for cases in Group I, longitudinal skeletal traction was used in 80% of cases for 3 weeks. At 3 weeks fracture become clinically "sticky" and early callus was seen on x-rays. Thereafter, skeletal traction was removed and derotation bar was applied for another 9-11 weeks. So after 12-14 weeks when radiological union occured, weight bearing was allowed. In our series 80% of patients in Group I developed coxa vara, knee stiffness and shortening. Other complications of recumbency such as pressure sore occured in 33% of cases, pneumonia in 20% of cases and urinary tract infection in 10% of cases.

Jensen et al (1980) demonstrated that dynamic hip screw was most suitable implant in their series of an intertrochanteric fracture of the femur treated by various internal fixation devices. The failure rate varied with the implant used.

Variable angle Mclaughin blade and plate	-53%
Fixed angle Jewett nail and plate	-44%
Ender's nailing	-19%
Dynamic hip screw	-3%

The failure rate was lowest with dynamic hip screw.

Laros and Moore (1974), emphasized that although dynamic hip screw was more technically demanding but had fewer complications of fracture, malunion and non union with it than any other treatment modalities of an intertrochanteric fracture of the femur.

In our study in Group II, 10 cases were treated by internal fixation with dynamic hip screw. There were no complications in 8(80%) cases. Only two cases (20%) developed superficial infection and shortening less than 2cm. Superficial infection was treated with appropriate antibiotics. There were no complication due to implant failure in any case. Pressure sore, pneumonia, urinary tract infection did not deveop in any case. 80% of cases in Group II had unstable fractures. These cases were allowed touch down weight bearing for 6 weeks after that partial weight bearing was allowed 20% of cases in group II who had stable fractures, were allowed touch down weight bearing with in first week of operation.

Jacobs et al (1980) demonstrated that dynamic hip screw allows an unstable intertrochanteric fracture to impact and thereby seek its own stability. This controlled collapse of dynamic hip screw improves the weight bearing capacity of implant.

Wolfgang et al (1982) noted that unstable fractures treated with dynamic hip screw had 10% mechanical failure rate even after obtaining bony stability. In our study there was no case of implant failure in unstable intertrochanteric fractures.

Rao and coworkers (1983) reported that in their series fixation with dynamic hip screw in unstable intertrochanteric fractures resulted in 90% of their fractures moving into a medially displaced position after surgery, indicating that there was no advantage to a primary medial displacement osteotomy. In our series medial displacement osteotomy was not performed in unstable intertrochanteric fractures before internal fixtion with dynamic hip screw and all unstable fractures ultimately united in anatomical or near anatomical position.

The low incidence of complications found after anatomical nailing in an intertrochanteric fracture by dynamic hip screw was noted by Friedenberg (1972) Sahlstrand (1974)

and Molhalland and Gunn (1972). In our series of intertrochanteric fractures treated by dynamic hip screw there was no complication except superficial infection in two cases which was controlled with appropriate antibiotics and shortening less than two cm. All fractures united promptly in anatomical or near anatomical position and all patients resumed their pre-fracture ambulatory status. So in Group II complications can be avoided and patients made more comfortable. The various complications not present in Group II was great advantage of surgery. Hornby and associates (1989) compared operative and conservative treatment for intertrochanteric fracture of the femur. In their series operative treatment produced better anatomical results and shorter hospital stay than did conservative treatment.

The results were evaluated and graded as excellent, good and poor as per criteria of Kyle (1979).

Excellent : No pain, minimum limp, normal range of motion, can walk without support, can squat and sit cross legged, no shortening.

Good : Occasional mild pain, noticable limp, acceptable range of motion, can walk with the help of cane, can

squat and sit cross legged, shortening less than 2cm.

Poor : Moderate pain, marked limp, limited range of motion, cann't walk, cann't squat and sit cross legged, shortening more than 2cm.

Using above criteria we achieved excellent results in 4 (13.4%) cases, good results in 6 (20%) cases and poor results in 20 (66.6%) cases in Group I.

In Group II, we achived excellent results in 8(80%) cases and good results in 2(20%) cases. There was no case with poor results in Group II.

Seeing the results we could achieve by conservative methods, results were poor in 66.6% of cases while the results were 80% excellent, 20% good and nil as poor after internal fixation with DHS, therefore, if condition permits internal fixation with DHS may be a treatment of choice in an intertrochanteric fracture of the femur.

Conclusions

CONCLUSION

Forty cases of intertrochanteric fracture of the femur, admitted in Out patient department and emergency department of M.L.B. Medical College, Hospital, Jhansi, were inlcuded in this study. From these cases, few were treated by conservative methods and were designated as Group I. Other cases were treated by internal fixation with dyanmic Hip Screw (D.H.S.) and were inlcuded in Group II.

The following conlcusions were drawn from the study

1. *Age and sex of patients* : Middle aged and elderly persons were most commonly affected by this fracture. Male to female ratio was 7:3.

2. *Mode of injury* : Injury due to fall (80%) was the most common cause of trauma resulting in an intertrochanteric fracture of the femur.

3. *Occupation* : Most of the patients were elderly dependents (22.5%) and poor farmers (27.5%).

4. *Side of limb* : Right side was involved in 55% of cases.

5. *Type of fracture* : Unstable intertrochanteric fractures accounted for 75% of all the intertrochanteric fractures

6. *Associated past illness* : Most of the patients (65%) had no past illness. Past illness was present in 35% cases.

7. *Associated injury* : Most of patients (90%) had no associated injury. 10% cases had fracture of some other bone as well.

8. *Conservative treatment* : Upper tibial skeletal traction was applied in 80% cases and below knee skin traction in 20% cases for three to four weeks followed by application of derotation bar in 80% cases and one and half hip spica in 20% cases for another 9-11 weeks in Group I cases.

9. *Operative intervention done* : In Group II cases, internal fixation by dynamic hip screw (DHS) was done.

10. *Interval between injury and operation* : Most of the patients (60%) were operated within Ist week of injury.

11. *Duration of immobilization* : In Group I, total duration of immobilization was 12-14 weeks which in Group II, patients were mobilized with in first week of surgery.

12. *Complications* : In Group I most complications like

pressure sore (33%), pneumonia (20%) and urinary tract infection (10%) were due to prolonged recumbency. No such complication was seen in Group II. In group I in 80% of cases malunion occured, there was shortening and coxa vara. No malunion occured in Group II.

13. *Radiological follow up* : There was reduction in neck shaft angle in all cases of Group I while normal neck shaft angle was maintained in Group II cases and there was no case of implant failure in Group II.

14. *Functional results* : The ability to walk without support, ability to squat and sit cross legged, range of motion at hip and knee were significantly better in cases where internal fixation with dynamic hip screw (DHS) was done.

15. *Final evaluation* : Taking the anatomical or near anatomical fracture union and restoration of the patient to his or her prefracture ambulatory status at the earliest possible and avoiding all problems of recumbency, the overall quality of results were better with internal fixation with dynamic hip screw (DHS) as compared to conservative methods.

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